In the Claims

Claims 1-10 (Cancelled)

11. (New) A method of holographic reconstruction using a display device including a light source and an optical system to illuminate a hologram encoded on a regularly structured spatial light modulator; the spatial light modulator being illuminated so that it generates a wavefront; the method comprising the steps of:

(a) controlling the spatial light modulator specifically so that the wavefront is associated with a virtual observer window at which an observer places at least one eye in order to view the entire holographic reconstruction, the step of controlling the spatial light modulator resulting in the virtual observer window being constrained to be substantially at the image plane of the light source;

(b) limiting the size of the virtual observer window to be no larger than a single diffraction order of the light diffracted from the spatial light modulator, the pitch of the spatial light modulator determining the maximum size of the virtual observer window and not the maximum size of the holographic reconstruction because the virtual observer window is substantially at the image plane of the light source;

(c) forming the holographic reconstruction anywhere within a reconstruction volume spanned by the spatial light modulator and the virtual observer window.

12. (New) The method of Claim 11, wherein the virtual observer window is positioned in relation to an eye of an observer.

13. (New) The method of Claim 11 in which the holographic reconstruction is made up of multiple discrete points and the hologram on the spatial light modulator comprises a region with information needed to reconstruct one such single point in the reconstruction, the point being visible from the virtual observer window, and is characterised in that:

the region (a) is encoded with information for that single point in the reconstruction and (b) is the only region in the hologram encoded with information for that point, and (c) is restricted in size to form a portion of the entire hologram, the size being such that multiple reconstructions of that point caused by higher diffraction orders are not visible at the virtual observer window.

14. (New) The method of Claim 13 in which the region has been generated by a projection from the virtual observer window through the single point onto the spatial light modulator.

15. (New) The method of Claim 11 comprising the step of time sequentially re-encoding a hologram on the spatial light modulator for one eye and then the other eye of an observer.

16. (New) The method of Claim 11 in which the holographic reconstruction is described by the Fresnel transform of the hologram and not the Fourier transform of the hologram.

17. (New) The method of Claim 11 in which a direct or inverse Fourier transform of the hologram is generated at the image plane of the light source.

18. (New) The method of Claim 11 in which the size of the virtual observer window is calculated as a function of the periodicity interval of the hologram.

19. (New) The method of Claim 11 in which the virtual observer window is smaller than the spatial light modulator.

20. (New) The method of Claim 11 in which there are separate virtual observer windows, one for each eye of the observer.

21. (New) The method of Claim 20 in which each virtual observer window is approximately 1cm x 1cm.

22. (New) The method of Claim 20 in which the locations of an observer's eyes are tracked and the positions of the virtual observer windows are altered so that the observer can maintain a view through each observer window even when moving his or her head.

23. (New) The method of Claim 11 in which the light source includes one or more individual light sources.

24. (New) The method of Claim 11 in which the light source includes one or more virtual light sources.

25. (New) The method of Claim 11, in which the light source is a line-shaped light source.

26. (New) The method of Claim 11, in which the light source is a real light source.

27. (New) The method of Claim 11, in which the light source is a virtual light source.

28. (New) The method of Claim 11, in which the light source is a point light source.

29. (New) The method of Claim 11, wherein several light sources are turned on to generate virtual observer windows for several observers.

30. (New) The method of Claim 11, wherein the light source is positioned by mechanical or electronic displacement, or by movable mirrors.

31. (New) The method of Claim 11, wherein information required to determine the position of the light source is provided by at least one position sensor that measures the position of the observer.

32. (New) The method of Claim 11 comprising the steps of assigning the virtual observer window to a first eye of a viewer and also assigning a second virtual observer window to the other eye of the viewer, the second virtual observer window being generated using a second light source.

33. (New) The method of Claim 32, wherein the optical system and the spatial light modulator are arranged so that higher diffraction orders of the hologram for the first virtual observer window have a zero point or an intensity minimum at the position of the second virtual observer window.

34. (New) The method according to Claim 33, wherein the spatial light modulator is re-encoded for the second eye at the same time as the second virtual observer window is generated.

35. (New) The method of Claim 11, wherein the holographic reconstruction is in color, and wherein the spatial light modulator is composed of cells arranged in a regular pattern with at least three openings per cell, representing the three primary colors, the phase and/or amplitude of said openings being controllable, and said openings being encoded individually for each primary color.

36. (New) The method of Claim 11, wherein a color reconstruction is achieved by at least three reconstructions in the individual primary colors, generated sequentially.

37. (New) The method of Claim 11, in which the hologram-bearing medium is a TFT display.

38. (New) The method of Claim 11 in which the spatial light modulator controls phase.

39. (New) The method of Claim 11 in which the spatial light modulator controls amplitude.

40. (New) The method of Claim 11 in which the spatial light modulator controls phase and amplitude.

41. (New) A display device including a light source and an optical system to illuminate a spatial light modulator, the device being adapted for holographic reconstruction, in which the light source illuminates the spatial light modulator so that it generates a wavefront; the device further including:

(a) a computational unit controlling the spatial light modulator specifically so that the wavefront is associated with a virtual observer window at which an observer places at least

one eye in order to view the entire holographic reconstruction, the computational unit controlling the spatial light modulator such that the virtual observer window is constrained to be substantially at the image plane of the light source; and in which:

(b) the computational unit is operable to limit the size of the virtual observer window to be no larger than a single diffraction order of the light diffracted from the spatial light modulator, the pitch of the spatial light modulator determining the maximum size of the virtual observer window and not the maximum size of the holographic reconstruction because the virtual observer window is substantially at the image plane of the light source; and

(c) the device forms the holographic reconstruction anywhere within a reconstruction volume spanned by the spatial light modulator and the virtual observer window.

42. (New) The device of Claim 41 further including a position sensor to track the location of the observer's eye or eyes.

43. (New) The device of Claim 41 in which the device includes a TFT flat screen as the hologram bearing medium.

44. (New) The device of Claim 41 in which the device is a television.

45. (New) The device of Claim 41 in which the device is a multimedia display device.

46. (New) The device of Claim 41 in which the device is a gaming device.

47. (New) The device of Claim 41 in which the device is a medical image display device.

48. (New) The device of Claim 41 in which the device is a military information display device.

49. (New) A computational unit adapted to control the way in which a hologram is encoded on a spatial light modulator specifically so that the wavefront generated from the hologram has a desired form at an image plane of a light source that illuminates the spatial light modulator, in order to constrain a viewing plane, at which an observer is required to view the reconstruction through a virtual observer window, substantially to the image plane of the light source.

50. (New) A spatial light modulator when forming part of a display device including a light source and an optical system to illuminate a hologram-bearing medium, the device being adapted to perform the method of holographic reconstruction using the method of Claim 1.